BOQ FOR COMPLETE SYSTEM

Item No	Description	Qtty	Unit
1	Complete IP based EPABX System and Associated items	1	Lot
2	Desktop Digital Telephone	34	Nos
3	Desktop IP Phone	9	Nos
4	Complete OFC Based LAN/WAN System	1	Lot
5	Complete FCBC System	1	Lot
6	UPS for Telecom Systems	3	Nos
7	PC, Workstation, Management Console	2	Nos

SECTION- I

TECHNICAL SPECIFICATIONS OF COMPLETE IP BASED EPABX SYSTEM AND ASSOCIATED ITEMS

Item No	Description	Unit	Qtty
1	Complete IP based EPABX System and Associated items	1	Lot

CONFIGURATION AND DETAILED BOQ FOR COMPLETE EPABX SYSTEM AND ASSOCIATED ITEMS

S/no	Description of Materials	Location Wise Details						
1	**IP EPABX Locations**	**SS-4**	**QC-L**	**SS-1**	**D/S**	**ADM**	**SB-1**	**Total**
2	Role (M=Main Unit, R= Remote Unit)	R	M	R	R	R	R	**6**
3	IP Communication Servers (in 1+1 dual and hot redundancy)	0	2	0	0	0	0	**2**
4	IP EPABX Locations with self-survivability	1	0	1	1	1	1	**5**
5	IP EPABX Locations without self-survivability	0	1	0	0	0	0	**1**
6	Equipped Analog Ports with dual CLI (FSK/PSK or DTMF) to display name & number	240	360	552	408	264	264	**2088**
7	Minimum Wired Capacity for Analog Ports	360	480	672	528	384	384	**2808**
8	Minimum Shelf Capacity (for Analog ports)	360	480	672	528	384	384	**2808**
9	42 U 19" Rack for IP EPABX, FCBC, OFC, LAN/WAN Other HW	2	2	2	1	1	1	**9**
10	Equipped Digital Extension Port	24	24	24	24	24	24	**144**
11	IP Link within same EPABX system (min no of full duplex voice channels)	60	60	60	60	60	60	**360**
12	IP Trunk with other IP-EPABX (min no of full duplex voice channels)	0	60	0	0	0	0	**60**
13	Minimum number of 10/100 Mbps Network Ports per Media Gateway	2	2	2	2	2	2	**12**
14	Equipped PRI-TRUNKS	8	4	2	2	0	2	**18**
15	IP Soft Phone SW + User License (min)	Min 20 user license						**20**
16	Desktop Digital Operator Console for complete system	0	0	0	0	2	0	**2**
17	PC based operator Console (Application SW only) for complete system	0	0	0	0	1	0	**1**
18	CALL Billing Server (Application SW only) for complete system	0	0	0	0	1	0	**1**
19	Integrated Auto Attendant System (In skin or PC/ Server based) for complete system	0	0	0	0	1	0	**1**
20	Integrated Voice Mail System (In skin or PC/Server based) for complete system	0	0	0	0	1	0	**1**
21	GUI based NMS for complete EPABX System	0	0	0	0	1	0	**1**
22	Analog PSTN Interface Ports (CO) with CLI Support	16	0	0	0	0	0	**16**
23	Music On Hold device with *.MP3, *.wav support (in addition to inbuilt MOH)	1	1	1	1	1	1	**6**
24	MDF 2000 Pair with krone module for total wired capacity (ports + trunks)	1	1	1	1	1	1	**6**
25	Installation Material Complete Lot	1	1	1	1	1	1	**6**
26	**Mandatory Spare modules of IP -EPABX System to be included and supplied along with main EPABX system**							
26.1	Analog line cards (min number of ports)	240	0	0	0	0	0	**240**
26.2	Digital Line Card (min number of ports)	48	0	0	0	0	0	**48**
26.3	IP Communication Server (in 1+0 Configuration)	1	0	0	0	0	0	**1**
26.4	CPU/control board(s) for self-survivability (at least one of each type)	2	0	0	0	0	0	**2**
26.5	PSTN Interface Board	1	0	0	0	0	0	**1**
26.6	Other System modules/ boards which are field replaceable, separable and identifiable physical entities of IP -EPABX System (at least one of each type)	8	0	0	0	0	0	**8**

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1.0 DETAILED TECHNICAL SPECIFICATION OF IP BASED EPABX SYSTEM AND ASSOCIATED ITEMS

A) **ENVIRONMENTAL CONDITIONS:** The offered IP based EPABX system shall be capable of maintaining its guaranteed performance when operating continuously round-the-clock under the following environmental conditions.

Operational Temperature Range	+5 ^{0}C to +35 ^{0}C or better
Storage	0 ^{0}C to +60 ^{0}C or better
Humidity	20% to 80% without condensation.
Shock and vibration	The equipment shall withstand transportation & handling by air sea & road under packed conditions
Electro Magnetic	As required for electronic equipment working in vicinity of HF/VHF/UHF systems

B) **TEC APPROVAL:** The offered model of IP based EPABX system should have approval from TEC for interfacing with PSTN. In this regard, duly notarized copy of TEC certificate is required be submitted with the un-priced bid document. This TEC certificate should be valid for minimum period of six months from bid due date.

The offered IP based EPABX system shall conform to the latest editions of standards like CCITT, CCIR, BS, IEC, IEEE, EIA, IS etc. and shall meet the following as a minimum:

1.1 SYSTEM ARCHITECTURE:

1.1.1 The IP based EPABX system shall be built around a server platform having CPU controller of following configuration

Min 2 GHz multi core commercial microprocessor,
Min 4 GB RAM
Min 250 GB Hard Disk /Flash disk/SSD Storage supporting (eSATA/ Raid 1)
USB/Flash/ card/portable media Port
Min 2x Gigabit Ethernet port supporting IPV4 and IPV6

The above configuration should be fully duplicated at Central Unit (Main Location) along with redundant power supply module.

1.1.2 The IP based EPABX system should be stored software / program controlled having multitasking operating system. The EPABX system software must be provided adequate protection from possible virus, worm and trojan infestation.

1.1.3 The IP based EPABX system should boot from Flash RAM/Flash Disk/Hard disk as per predefined / user selectable boot sequence. During start up, it should be possible to interrupt a predefined boot sequence to perform maintenance and diagnostic operations through a command line interface.

1.1.4 It should be possible to take system backups in Flash RAM / Flash Disk / Hard disks/CD/DVD automatically /manually/predefined way.

1.1.5 Software Applications, CPU, Memory & Storage of offered communication servers shall be sufficient to deliver the present configuration as well as future system upgradeability upto 10,000 ports including addition of new sites/ media gateways connected via LAN/WAN network.

1.1.6 The IP based EPABX system should have fully non-blocking architecture at all levels like System processing, Switching fabric & other resources like DTMF receivers, R2 Receivers.

1.1.7 The IP based EPABX system shall be designed with IP at the core, allowing fully distributed IP solutions across data networks. The offered system must be fully IPV4 complaint at the time of delivery at site.

1.1.8 The IP based EPABX system must be IPV6 ready without any cost implications for system up gradations for making the system IPV6 compliant. In this regards an undertaking from OEM of IP EPABX system needs to be submitted along with technical bid.

1.1.9 The IP based EPABX shall support following traditional TDM or mixed IP-TDM or full 100% IP configurations on the same platform using same loaded software and licenses:

(1) IP Communication Devices like IP Phones, Mobile IP Phones, multimedia PCs, SIP phones, Soft Phone or H.323 terminal devices etc.

(2) Legacy TDM communication devices (Digital and analog 2 Wire telephone instruments with caller-id (FSK or DTMF), Fax, modems, ISDN Phones etc

(3) Wireless/ Mobility/ Limited mobility in local loop like, DECT, VoWLAN, WiFi

(4) Dual mode Fixed Mobile Convenience (WiFi/ Cellular)

(5) Analogue Digital and IP Trunking : CO, E&M , E1/ ISDN- PRI and SIP/IP

(6) Digital Phones & Analogue Phones directly connected to the EPABX system shall have smooth & trouble-free operation using standard 2-wire telephone cable with minimum length of **800** meter and **5Km** respectively from EPABX system.

1.1.10 The IP based EPABX system should be based on universal port architecture and modular in design to enable seamless growth of subscriber & trunk interfaces by adding necessary cards/sub racks as and when required. System should not impose any restriction in terms of slots usage for a particular functional benefit.

1.1.11 The IP based EPABX system should support at least following voice encoding standards:

(i) G.711 (iii) G.729/A/B (iv) G.722 wideband

1.1.12 The IP based EPABX call switching for internal calls (i.e., limited to a single location) should be based on the G.711 uncompressed PCM standard, but WAN calls outside the location should use the G.723.1 or G.729/A/B compression algorithm.

1.1.12 The IP based EPABX system must support Network Time Protocol to synchronize the system data/time of network devices.

1.1.13 The IP based EPABX system should be suitable to accommodate both Decadic Pulse (DP) and DTMF telephones. The system should support outgoing DTMF transmission even from Digital phones.

1.1.14 The IP based EPABX system should use CAC (Call Admission Control) mechanisms to optimize the usage of the bandwidth in the WAN for multi-site configurations.

1.1.15 The voice and signalling frames in the IP based EPABX system should be marked (tagged) in order to be recognized. The standards of marking supported will be: Layer 2: IEEE 802.1p/Q and Layer 3: TOS / DiffServ

1.1.16 VoIP Support:

a. The IP based EPABX system should support VOIP solutions as an integral part of the system. No separate/dedicated hardware unit/module shall be required for providing telephone services for IP phones. It also should not involve any dedicated external gateways, routers etc for VoIP support.

b. The IP based EPABX system should be fully compliant to VOIP standards like H.323/ SIP (Session Initiation Protocol).

c. The SIP proxy, SIP registrar should be inbuilt in the system and should support any SIP compliant hard phones or soft phones.

d. The IP based EPABX system should support the QOS features for the VOIP implementation.

e. The system must support Echo Cancellation mechanism in IP Telephony to improve voice quality.

f. When a Desktop PC is connected behind an IP phone (on the same LAN switch port), the VLAN policy of VoIP interfaces should be configured by MAC address. In this way, the default VLAN (called native VLAN) of the Switch is applied to the PC. Explicit VLAN tagging from IP Phone is not necessary.

g. If the Switch is not able to use VLAN by MAC address, the IP phone must explicitly tag and use IEEE 802.1q (DHCP, TFTP, signalling and voice are tagged) and the default VLAN value for the frames sent by the PC is dynamically assigned by the Switch. The explicit tag is managed from the IP Phone.

h. The IP based EPABX system should be able to work on any industry standard based IP network infrastructure.

i. The IP based EPABX system should be designed to provide high uptime of 99.99%.

1.2 System Survivability:

1.2.11 The IP based EPABX system should offer maximum availability/uptime along with hot standby configuration for its common & critical control units. In the event of significant fault in the critical resource elements/units/modules of EPABX system, the call control processing & management function shall automatically switch-over to an alternate or redundant control unit without any disruption to on-going traffic and also without any degradation of EPABX performance.

1.2.12 All critical resource elements of IP based EPABX system (i.e. Call server, Processor, Hard disks, RAM, data bases, IP interfaces, DSP resources, Clocking sources, Signalling and Tone generators, all the IO ports - Serial and Ethernet TCP/IP port, Power supplies, Ring generators, DTMF receivers, Tone detectors etc.) must be redundant and in a hot-standby configuration without any single point of failure. The bidder must specify list of redundant items / modules included in the hardware & software configuration of the system to be supplied along with technical bid.

1.2.13 The control unit/ server (hardware & software) of IP based EPABX system should have physically duplicated configuration for its control processor, memory & power-supply module without any single point of failure. It should also conform to the model of complete "mirroring" of the information (both static and dynamic data.) as used in most computer systems.

1.2.14 There should be redundancy in the LAN segment involving the active and standby control units / servers through utilization of redundant LAN ports over a campus wide carrier class LAN with OFC backbone. The specification of this LAN Network is mentioned elsewhere in Technical Specification section of tender document.

1.2.15 The standby server should always be in sync (database) with the active server without any need of manual configuration & administration.

1.2.16 These active-standby servers should provide automatic failover of call processing of IP based EPABX system in such a manner that if one active server fails the standby server should be able to take the complete load of the calls automatically (without any manual intervention) & without dropping any active calls.

1.2.17 The Management Platform of IP based EPABX system must provide a backup mechanism for all critical system information in manual and an automatic/scheduled archival and a Disaster Recovery /System Restore mechanism.

1.2.18 Addition / replacement of cards in IP based EPABX system shall be hot swappable (i.e. in power on condition) without affecting the function of other modules/units of the system.

1.2.19 The IP based EPABX system should be able to restart automatically & resume its normal operation without human intervention when power supply to the EPABX system is resumed after complete power failure.

1.3 Security Provisions:

1.3.11 System, while communicating with its associated components or / and IP based system over IP link (LAN/WAN), shall support the encryption of all IP packets with advanced encryption mechanism like: AES.

1.3.12 For the purpose of access over IP network, system should only allow secured access mechanism like SSH, HTTPS, SNMP.

1.3.13 Provision shall be available to bar unauthorized user to connect to the system.

1.3.14 Provision shall be available to protect the system against various, malwares, and network-based attacks like broadcast storms or denial of service (DOS) attacks.

1.4 System Features:

1.4.11 The IP based EPABX system should function as Local as well as Transit switch capable of switching and routing of voice, data, video and images without any delay, degradation and blocking of user traffic.

1.4.12 The IP based EPABX system shall provide field programmable, flexible & user defined numbering scheme. The IP based EPABX should be suitable for up to 8-digit extension numbering scheme. This numbering scheme should be flexible and freely programmable (ie any number can be programmed in any board of main system or remote gateways). System should also allow mixed numbering scheme.

1.4.13 The IP based EPABX system should support automatic route selection to route the calls based on user definable priorities. This service will be transparent for users and irrespective of the physical carrier connections.

1.4.14 Integrated Auto attendant and Voice mail System

The IP based EPABX shall be equipped with Automatic Attendant application, which shall automate handling of incoming calls. The system shall answer the incoming call & guide the caller through a high quality voice guides for various options like to choose extension, operator, or directory service. The call shall be automatically routed to the destination. In case of non-response from the caller's end, the call will automatically flow over to the operator, after a pre-set delay.

Auto-attended system should be able to answer minimum 8 incoming calls simultaneously and place callers on hold, play inbuilt music on hold and inform them of their position in the holding queue. The switchover from night message to daytime message must be automatic.
Voice Mail System: The IP based EPABX shall be equipped with Voice mail System to route, record, store and playback voice mail messages depending on line condition or user requirement.
Details specification of Auto attendant and Voice Mail System is mentioned elsewhere in the tender document.
All software's, firmware and applications of Auto Attendant and Voice mail system must of same OEM /or certified by OEM of Offered IP EPABX system for compatibility with respect to hardware, software, features and functions of offered IP EPABX server platform and its associated applications.
In addition to the above offered solution should support future upgradability to Unified Communications for mail, video and mobile voice and data communication.

1.4.15 The IP based EPABX system shall have provision of automatic line testing. The system shall also have provision of automatically identifying and isolating the faulty trunks and the trunks connected to faulty media. For equipped E-1/ PRI trunk, the EPABX system shall also automatically detect line fault conditions like: LOS, AIS etc of connecting E-1 (G.703) link/media and accordingly, isolate the connected E-1/PRI trunk port from call routing. Once the faulty media / line problem gets resolved, isolated analog & digital trunks / junction shall automatically become operational.

1.4.16 The IP based EPABX system should be equipped with Call Billing System based on Microsoft windows (Vista/7) platform for complete recording of Internal, External and Network calls to and generate various types of traffic reports such as STD / ISD / Local calls made from an Extension. Details specifications of Call billing system are mentioned elsewhere in the tender document.

1.4.17 Digital or IP phone user should be able to search through the directory and dial by name. This directory should be synchronized with central organization wide directory using LDAP. The phone user should also be able to see the list of last 20 missed calls and dialled numbers

1.5 System Management:

1.5.1 The IP based EPABX system shall be field programmable using PC/Server based Programming & Maintenance system for setting / modifying all the system, user, trunk, operator parameters & features. The access control for system management operation shall be through password protection and must provide Role Based Account Management to define different levels of administrator access depending on specific functional responsibilities as mentioned below:

User : For viewing purpose only
Operator: For view and modify station/ trunk/ network features
Owner : For view and Modify all system level setting configuration

Vendor shall install & configure the PC/Work station with necessary software, firmware & hardware to function as PC based programming & maintenance system of offered EPABX system. The same desktop PC shall also be used for Call Billing System wherever required. Hence, both Programming & Maintenance and Call Billing operations must be possible simultaneously from one desktop PC platform using single Ethernet interface.

1.5.2 Programming & Management: System console should also support programming and maintenance through following applications:

1) Windows based GUI /Application software over LAN/WAN/VPN.
2) Browser based Http/Https access over LAN/WAN/VPN
3) SNMP over LAN/WAN/VPN
4) User friendly interactive Command line interface using Telnet/Terminal SW OR HyperTerminal

1.5.3 The management platform must provide a user friendly GUI (Graphical User Interface) for the following tasks/operations:

1.5.4 **Configuration and Programming** of services, users, categories and all system parameters and features. This module must provide centralized management in local or remote environments of a single system or a network. The network manager will be able to quickly and easily edit, create or delete any network object by the use of import/export functions and multiple operations.

1.5.5 **Faults and Alarms Management:** It shall have the provision for instant fault information, provision of automatically identifying and isolating faulty extensions & trunks and capability for malicious call tracing. It should also manage all the incidents and generate event/alarms reports informing date, hour & severity level with colour indication according to the severity level of the alarm. This module must be able to centralize the alarms and events of the total system (including remote units if any).

1.5.6 **Accounting of all calls generated** by the users including cost, date, hour. Must provide different options to group the monitoring of the calls (cost centre, extension number, trunk, user, city/area associated to dialled numbers). EPABX system should have buffer of last 30 days call details in case of Call billing system/ management system failed.

1.5.7 **Network Topology Layout:** The management system should provide a topological view of the telecommunications system in graphical form such as central EPABX, remote unit(s) and connectivity.

1.5.6 **Security**: All management traffic between the remote console/session and the control & management system/ unit must be encrypted for necessary system data security.

1.5.7 **Remote Access**: The IP based EPABX system shall have the provision of remote monitoring, programming & maintenance of EPABX system. This remote monitoring, programming & maintenance of IP based EPABX system from outside by the vendor shall be possible by accessing the system through INTERNET OR DIRECT dial-up modem connection.

1.6 REMOTE UNITS: The Central Unit of IP based EPABX system shall support provisioning, operation & management of Remote Unit(s) at different locations. The Remote Unit shall meet the following as a minimum:

1.6.1 The Remote Unit shall be an integral part/unit of central IP based EPABX system. The integrating link/interface between the central EPABX system & Remote unit shall be an IP link (over LAN/WAN).

1.6.2 All management functions like: System Configuration, Programming, Fault/Alarm management, and System database backup, Accounting/Logging of traffic/calls etc. for the connected Remote units shall be provided remotely from the central EPABX system.

1.6.3 The Remote unit shall provide all features & facilities as those of central IP based EPABX system without the mandatory provision of redundancy of its common & control unit(s).

1.6.4 The Remote Units shall provide following types of inter-office/unit both-way communications in addition to normal intra-office/unit communication:

- Between central EPABX system and Remote unit over redundant IP Link
- Inter Remote units (say between location-A & location-B) over TDM and/or IP trunk
- Inter Remote units (say between location-A & location-B) via central EPABX system over TDM and or IP trunk
- Between Remote unit and other EPABX system (other than central EPABX) over TDM link
- Between Remote unit and other IP EPABX system over IP links (other than central EPABX and running on same IP trunking protocol)

1.6.5 Remote unit shall support survival mechanisms that allow them to maintain 100% of the telephony services for their user / trunk interfaces without any degradation in the intra & inter unit calls/traffic over available media / trunks, in case of failure in IP connectivity with central EPABX system for a minimum duration of 30 days. Once the IP connectivity between remote unit & central EPABX system is restored back, the remote unit shall work with central EPABX system.

1.6.6 The Remote unit should be able to restart, reboot automatically & shall provide 100% of telephony service as mentioned above without human intervention when the input power supply to the remote unit is resumed after complete power failure, even under the failure of IP connectivity with central EPABX system.

1.6.7 All components, modules, sub-systems of a Remote unit shall be able to operate in the input DC voltage range from -42

to -54 VDC supply (<5-25 Amp @ 48 VDC).

1.6.8 Basic building blocks (i.e Media Gateway, Control boards, switch, power supply units, peripheral boards etc) of all Remote units must be identical and interchangeable in terms of make, model, hardware and software version.

1.6.9 Each media gateway used for building a Remote unit of required configuration shall provide following facilities as minimum

- Redundant power supply unit
- Redundant 10/100 Mbps LAN ports
- Min 8 Universal slots for peripherals boards (Analog, Digital line and trunks)
- Min 1 Optional Control unit for self-survivability (as per site requirement).

1.7 **INTER-OPERABILITY WITH OTHER EPABX SYSTEMS:**

1.7.1 The IP based EPABX system should be able to inter-connect with GAIL's existing Alcatel, Coral, Tadiran, Ericsson, Siemens, Avaya EPABX systems through different types of Subscriber lines, Junctions, Analog, Digital and Compatible SIP/IP Trunks.

1.7.2 The IP based EPABX system shall work seamlessly in multi-vendor (Q-sig compliant) EPABX network environment with connectivity to PSTN. The Exchange shall support Q-Sig on PRI / BRI and shall be suitable of being networked with the existing ISDN EPABX systems with feature transparency.

1.7.3 **IP Trunking**: Offered IP Based EPABX system should be capable of providing seamless IP trunking with existing IP EPABX systems (equipped with IP /SIP trunking module) connected over LAN/WAN/ VLAN and VPN/SVPN over public Data Network

1.7.4 **Input Power:** All modules/Systems/Sub systems of the IP based EPABX system should operate in the input DC voltage range from -44 to -54 VDC supply provided from proposed SMPS based FCBC system including the following:

- Communication Servers
- Media Gateway (Peripheral Shelf)
- Remote Shelf consisting of media gateway and control unit for shelf survivability

IP based EPABX system should be equipped and capable of taking DC power from at least two different power sources. Each Shelf, Sub rack, media gateways (having same backplane for mounting system or peripheral board) shall be equipment with at least two different power supply modules.
Any other system peripherals which require different supply other than -48VDC must by connected using suitable DC/DC converters designed to operate on round the clock basis. Use of AC/DC Adapters etc is not acceptable for technical reasons.
AC voltage range from 180 to 270 VAC (50 Hz) through supplied UPS is proposed for following devices

- PC Work stations (Management Console, Voice Mail, Auto attendant, Call Billing Server)
- Communication Servers (As an alternate option to DC input)

1.7.5 **INTERFACING FACILITIES:** The IP based EPABX system shall be able to provide following interfacing facilities:

a. All the Analog & Digital extensions should operate on two wires only.

b. The exchange must support following trunk interfaces/protocols:

i) Analog: E&M (2W), E&M (4W), DC Loop signalling, Decadic, DTMF Signalling, Analog lines in Ring down mode.

ii) ISDN-PRI, R2MFC, CEPT (programmable for either E1 or PRI) Trunk.

iii) QSIG compliant.

iv) ISDN-PRI trunks & BRI (Subscriber/Trunk)

v) All the common Signalling Standards for PSTN connections

vi) LAN/Ethernet, TCP-IP over IPv4 (interface should be IPv6 ready)

vii) E1 (G.703, Balance)

viii) Shall support VoIP phones and VoIP trunks without needing external Server/gateway/other device

1.8 **Telephony Facilities:** The IP based EPABX shall provide following telephony facilities as a minimum:

i. Operator Console connectivity

ii. Auto-attendant facility for DID through integrated auto-attended system

iii. FSK-PSK or DTMF dual Caller Line Identification (CLI) for all Digital , Analog subscribers to display name and number of caller.

iv. Caller Line Identification for All Analogue/digital / IP trunks

v. User programmable Station groups like: Call Pickup, Hunt on Rotation, Emergency call, parallel ringing

vi. Connected Line identification to display name and number of connected line after dialling.

vii. 3-Party Conference , progressive conferencing with any combination of subscriber and trunks

viii. HOT line service

ix. Direct inward dialling (DID) through C.O lines

x. In-built tone or voice guide based announcement facility with distinctive tone or good voice quality for (i) incoming trunks / PSTN calls. (ii) Extension status /code fault conditions, (iii) no answer conditions (iv) Feature activation/deactivation conditions (v) Supervised call routing etc

For each line condition the system should generate audio tone and / or corresponding voice guide to explain the particular line conditions / available options to user
Example: If the called number is busy
Exchange will first give a busy tone and / or play the corresponding voice guide as " The called number is busy, please press #1 to call back, #2 to leave message (to voice mail) or #3 to camp on"

xi. Music on hold: The IP based EPABX System should provide following type of Music on hold

- In-built Music on Hold with melodious music having high audio quality
- External Music on hold with melodious music having high audio quality, audio level selection, recording / changing of MOH using PC/USB interface. Music on hold should support most popular digital audio format like *.wav, *.mp3 etc. Each site should be equipped with external MOH device in addition to internal MOH.

xii. User Programmable Feature and Service class for Extensions & Trunks.

xiii. Area Code Restriction

xiv. Abbreviated Dialling.

xv. Mixed Mode dialling (DTMF / Pulse interchangeability).

xvi. Discriminative ringing for internal calls, junction/trunk calls, auto call back, wake up service and emergency reporting service

xvii. Call Parking.

xviii. Call waiting.

xix. Line lockout

xx. Automatic Trunk Route selection on trunk overflow & fault

xxi. Night service mode

xxii. Paging interface.

xxiii. Boss-Secretary grouping

xxiv. Malicious call trace.

1.9 **Extension Service Features**: The IP based EPABX system should provide following Extension service features:

i) Direct Outward Dialling

ii) Extension to extension calling

iii) Auto /manual Call Back on busy

iv) User, System defined conditional Call Forwarding (on Busy, No Answer, all call with user/ system defined time)

v) Call Forwarding Cancel

vi) Call Transfer

vii) Direct Call Pick up

viii) Group call pickup

ix) Do not Disturb

x) Pad lock facility or STD/ISD locking and shall not restrict local outgoing & intercom calls.

xi) Operator call

xii) Operator assisted calling

xiii) Add on Conference

xiv) Station camp on

xv) Trunk camp on

xvi) Executive override with and without tone indication

xvii) Last Caller Re-Dial after no answer /hung up by caller (different than Last Called Number Re-Dialled)

xviii) One Number Service – Parallel ringing

xix) Class of service timing (day/night/holiday)

xx) Broker service

1.10 **Hardware configuration**: The bidder shall supply the same model of cards for any given type of extension/trunk interface such as Analog line, Digital extension line, BRI, PRI etc for each site. Multiple models of cards for same type of interface are not acceptable. In general following specification design guidelines should be strictly followed for delivering the offered IP Based EPABX system:

- All EPABX hardware should be 19" rack mountable
- All medial gateways, remote shelves should be of same type

- Each media gateway/remote shelved should have at least 2x 10/100 Mbps LAN ports supporting 1+1 or 1:1 configuration
- Each media gateway / remote shelf should be modular having min 8 universal slots per module for peripheral boards without having any restriction of backplane bus capacity.

Peripheral modules should support following hardware configuration

Analog subscriber Board	= minimum 16 Circuits/ per Board
Digital Subscriber Board	= minimum 08 Circuits/ per Board
CO/ PSTN Trunk Board	= minimum 08 Circuits/ per Board
ISDN/ PRI Trunk Board	= minimum 01 Circuits /per Board

1.11 Main Distribution Frame (MDF) for exchange side of supplied EPABX system shall meet the following as minimum :

a. Connectors : Genuine Krone LSA module equipped as per total wired capacity per site
b. Type of enclosure : Metallic Fully covered Floor Mounted (Rack) Or Wall mounted (DB)
c. Size : Should be sufficient to accommodate at least 2000 analogue ports
d. Insertion tools : 12 No's Genuine Krone Make
b. To be equipped with line protection units (IPM) fuse for all Trunk & CO lines.
f. 100 number of Jack for line isolation and monitoring for each site

1.12 Earthing System:

Wherever possible existing equipment earthing shall be used for EPABX system and associated item. If existing Earthing is found unsuitable for new system, vendor shall provide separate earthing arrangement without any additional cost implication to GAIL. The specifications for the telecom earthing system are as follows:

1.12.1 The pit will consist of a copper plate of 600 mm (W) x 600 mm (D) x 6 mm (T) being placed into the ground. Earth Pits shall have a minimum of 1.5 meter clearances from the walls of the building/ Shelter.

1.12.2 The earthing pit installation procedure shall be as per the following:

A pit of 2500 mm depth and 1000 mm diameter will be made. The copper plate 600 mm (W) x 600 mm (D) x 6 mm (T), the copper strip 25 mm (W) x 3 mm (T) and ¾" GI Pipe will be bolted with brass nut and bolt. The bottom of the pit will be filled with the charcoal and salt layers as shown in the diagram. Assembly of the electrode will be inserted in the pit and will be hold vertically till the next below mentioned fillings are made. The copper plate will be at the depth of 1.65 mtrs from the stiff soil. The copper plate shall be covered in layers of charcoal, salt and mud as shown in the drawing. The electrode is surrounded by an homogenous layer of highly conductive material. With average moisture content, this will form a conductive electrolyte throughout a wide region surrounding the earth electrode, thus reducing the earth resistivity. The earth resistance offered by this pit is less than or equal to 2 ohms for Telecom earth. For watering these layers the GI pipe will have holes of 14 mm diameter at equal intervals for water to flow in the pit to maintain the earth resistivity at regular intervals. This GI Pipe will have funnel on top to pour water and bolted with copper plate of size 250 mm (W) x 50 mm (D) x 4 mm (T) and this plate shall be laid horizontally as shown in the drawing. One insulated Copper cable (cross-section: 25 mm2) will be extended and connected to Telecom Earth Bus bar 250 mm (W) x 30 mm (D) x 5 mm (T) in Telecom room. The bar will be mounted on ceramic insulators. On completion of compacting the filling material a chamber of 400 mm(L) x 600 mm (W) will be prepared using bricks and cement around the earth electrode funnel. On curing of the cement a MS cover plate 450 mm (L) x 450 mm (W) will be installed on top of the chamber for protection.

1.13 REQUIRED EPABX CONFIGURATION:

The configuration & setup of these new IP based EPABX systems are envisaged as under, wherein the Equipped & Additional Wired capacities of various interfaces are indicated.

- **For Equipped Capacity:** The vendor shall supply, configure / provision & commission the complete facilities including the required hardware, software, firmware, cabling, and terminations in the supplied system.

- **For Additional Wired Capacity:** The vendor shall keep the system ready with all cabling terminated at both equipment (for vacant / free slot) & MDF ends excepting the provision of hardware module in the supplied system. With the installation of interface module in the wired slot, the facility will be available at MDF. In bill of materials, wired capacity is defined in terms of number of analog ports only. (i.e. excluding CO-trunk, other ports)

- **For Shelf Capacity:** The vendor shall keep the system ready with spare capacity in media gateways (equipped with sub rack, backplane, Power supply and other common and control boards) for addition of subscribers, trunk modules

in vacant / free slots of existing media gateways. In bill of materials Shelf capacity is defined in terms of number of number of analog ports only. (i.e. excluding CO-trunk, other ports) Analog ports only.

In addition to the above mentioned Equipped & additional wired and shelf capacity, the IP based EPABX system should also be expandable up to 10000 ports. This expansion should be in building block architecture by adding on additional cards / stacks / cabinets at central EPABX system and/or existing Remote units and also by addition of new Remote unit(s) under existing central EPABX system. However, such expansion up to the defined **Expandable Capacity** should not involve any addition / up gradation of Processor, Software, license or any of the other common control hardware of existing central EPABX system and Remote units.

For each of the sites, licenses has to be supplied for all hardware module / software / firmware of the IP based EPABX systems up to the aggregated capacity of their individual 'Equipped Capacity' & 'Additional Wired Capacity', as mentioned in detailed BOQ and configuration Sheet.

1.14 INTER-CONNECTION WITH EXISTING GAIL-EPABX SYSTEMS:

The supplied IP based EPABX system shall be interconnected to following EPABX systems over existing media provided by GAIL. The interconnection of new & existing EPABX system shall be for seamless inter-office EPABX communication in line with interconnectivity scheme & exchange access numbering scheme.

S/No	Location	Equipment make /model	Existing Interface
1	TOWNSHIP, PATA	SIEMENS HIPATH 4000	1 x PRI (*)
2	GAIL DIBIYAPUR	ALCATEL IP OMNIPCX	1 x PRI (*)
3	GAIL VIJAIPUR	ALCATEL 4400	1x PRI

(*) The supplied IP base EPABX system is proposed to be integrated with the EPABX system of GAIL Gaon and GAIL Dibiyapur over IP LAN/WAN network. Offered EPABX system should have adequate ports/ HW/ SW capability, license etc. for implementing such connectivity in future. Requisite Network connectivity, Hardware, Software license etc of existing EPABX side shall be provided by GAIL.

1.15 Technical Specifications of Associated Items

Detailed technical specifications of following associated items are enclosed in these sections for designing, building and delivering the required site specific configurations:

1.15.1 TECHNICAL SPECIFICATIONS OF 42 U, 19" RACK ENCLOSURE
1.15.2 TECHNICAL SPECIFICATIONS OF DESKTOP DIGITAL OPERATOR CONSOLE
1.15.3 TECHNICAL SPECIFICATION OF PC BASED OPERATOR CONSOLE (SW)
1.15.4 TECHNICAL SPECIFICATIONS FOR IP SOFT PHONE

1.15.5 TECHNICAL SPECIFICATION OF CALL BILLING SYSTEM

1.15.6 TECHNICAL SPECIFICATION FOR INTEGRATED AUTO ATTENDANT CUM VOICE MAIL SYSTEM

1.15.7 TECHNICAL SPECIFIACTIONS OF VOICE, DATA, SIGNAL AND POWER CABLES

1.15.8 TECHNICAL SPECIFICATIONS OF INSTALLATION MATERIALS

1.15.1 TECHNICAL SPECIFICATIONS OF 42 U, 19" RACK ENCLOSURE

Industrial enclosure /Networking Rack to be provided at each EPABX locations to accommodate following equipment's / sub systems:

- Communication Servers
- Central Unit Media Gateway, Peripheral shelves
- Remote Gateways, peripheral Shelves
- L2/L3 Switch, Ethernet over Fiber modules
- Fibre management System
- SMPS based FCBC unit for -48VDC input
- SMF battery banks
- Any other associated hardware
- Space for future up gradation

The offered equipment racks shall meet or exceed following specifications

S/no	Parameter	Min Specification
1	Make	OEM of IP EPABX OR /APW/PRESIDENT/ RITTAL/SCHNEIDER
2	Model	Vendor to Specify
3	Description	19", 42 U Rack Enclosure
4	Dimension	min 800x800 (WXD) in mm
5	Height	min 42U
6	Equipment mount	19 "rail
7	Front door	PEROFORATED STEEL SINGLE DOOR WITH LOCK
8	Rear door	PEROFORATED STEEL SINGLE/DOUBLE DOOR WITH LOCK
9	FAN	4 x 230V, 90 CFM – fitted at the top
10	Lighting	02x CFL (8W) /LED (3W) lights with automatic on/off switch
10	Heavy duty shelf	to accommodate SMF batteries
11	Shelves	to accommodate / support equipment's modules smaller than 19"
12	Mounting frames	as per site requirement
12	Support Angles	to support heavy modules - as per site requirement
14	AC distribution unit	as per site requirement
15	DC distribution unit	as per site requirement
15	Cable management	01 Lot As per requirement
16	Earthing continuity	01 set
17	Load bearing capacity	~ 400 Kg
18	Material standard	Vendor to specify
19	Finish	Vendor to specify
20	Color	Vendor to indicate available options

1.15.2 TECHNICAL SPECIFICATIONS OF DESKTOP DIGITAL OPERATOR CONSOLE

The IP based EPABX system should support Digital Desktop Operator Console, which shall have connectivity with EPABX system using one pair /two pair of telephone cable and it shall provide the following minimum facilities:

- Operator Extension should be configurable for Working Hours and Non-working Hours
- Minimum 30 functional and programmable keys
- Control / Direct access to specified trunks
- Minimum 2 Line/40 character alphanumeric display
- DTMF Dial Pad with call processing buttons.
- Lamp indications for console status.
- Multiple tenant groups with designated group queue and night service extensions.
- Trunk verification
- Name dialing
- Status indication of Station.
- Serial Calling.
- Priority Queuing
- Force trunk release.
- Override/Barge- in
- Monitoring of ongoing call Programmable enable and disable.
- Trunk group status
- Last Number redial
- Hands free dialing
- Date and Time Display
- Multiple line appearance with incoming call queue

IF offered EPABX system does not support desktop Operator Console, majority of the features /functions needs to be implemented by supplying and using digital phones of same make which does not require any external power. Min specifications of digital phones are mentioned in section –II.

1.15.3 TECHNICAL SPECIFICATION OF PC BASED OPERATOR CONSOLE (SW)

The IP based EPABX system should be equipped with PC based Operator Console which shall have connectivity with EPABX system using Ethernet (10/100/1000 Mbps) interface over LAN. This PC based operator console shall provide all functionality of desktop operator console as mentioned above using:

- GUI based Desktop Application Software
- Customizable role, appearance, configurations
- Programmable keys for Speed dial / feature / functions
- Multimedia Kit (Microphone, Headset)

The desktop PC for PC based Operator Console shall be provided by GAIL having following min configuration. Windows XP/Windows Vista/ Windows 7 OS based Desktop PC with Intel Processor and RAM 512 MB, Hard disk 40GB along with the colour monitor, Mouse & Keyboard.

1.15.4 TECHNICAL SPECIFICATIONS FOR IP SOFT PHONE:

The vendor shall supply & install Soft Phone Client in GAIL's Desktop PCs/Laptops (having Windows OS & speaker microphone Headset interface), working on either GAIL's Intranet or has the VPN connectivity to GAIL-Intranet over Internet. The soft phone on its installation in desktop PC/Laptop should act as Soft Phone of IP based EPABX system and shall provide following minimum functionality:

(a) Soft-phone user shall have access to telephony services as any other user of the IP based EPABX
(b) Soft-phone shall be able to make outgoing calls, receive incoming calls and shall have facility to:

(i) Take, Clear, Transfer call
(ii) Dial DTMF tones
(iii) Redial the last number
(iv) Send a call back request
(v) Put a call in conference
(vi) Put a call on hold
(vii) Request Call back

(c) Soft-phone application shall offer phone line graphical interface to allow the user for its configuration.
(d) Soft-phone shall be able to handle USB based handsets, connected to associated Desktop PC/Laptop.
(e) For the connection using thin client the session shall be secured by the use of HTTP (HTTPS).
(f) Shall have support for strong authentication mechanism for users accessing the application.
(g) Application sessions shall close automatically after an inactivity period.

1.15.5 TECHNICAL SPECIFICATION OF CALL BILLING SYSTEM

Standard features of Call Logging & Billing System: The IP based EPABX system shall support Window based user friendly Call Logging & Billing system, which shall facilitate the following:

1.15.5.1 It should be PC-based system with Real Time calls display compatible with offered IP EPABX system. The call detail record (CDR) format can be re- programmed after installation to matches the particular CDR format that EPABX is sending out.

1.15.5.2 It should provide Exports/imports interface for CDR, Billing connector for other application to retrieve telephone charge information for other purpose

1.15.5.3 It should provide highly reliable and secure storage of call data. The CDR received from EPBAX will be saved to text-based log file first, and then be processed. The processed CDRs and other information are to be stored in a database. After processing and storage no data should be allowed to alter, edit, modify or delete afterwards.

1.15.5.4 Other Feature:

It should provide CDR via RS232 or TCP/IP

It should have Data Processing capability after updating rate table or user information.

All amendments made to the databases must be applied instantaneously.

The system must be fully customizable as per organization requirement by add/del/modify any field in database.

All reports must be provisioned to filter by selecting desired setting and report will be displayed of selected filter /layout.

1.15..5.5 The Call billing software shall have the provision for adding/modifying/deleting the STD/ISD/Local codes, call tariff & call time zones at site as & when required to accommodate the changes carried out by DoT / Service provider time to time.

1.15.5.6 System capability:

1. User friendly GUI and icons toolbar
2. Auto backup and purge
3. Easy entry on tariff table.
4. Auto insertion of extension number in databases to reduces the administrator's work.
5. Backup files in compressed format to allow easy data storage onto HD.
6. Rebuilds and compacts database for performance optimization (e.g. printing)

1.15.5.7 General Report features of call billing system

1. **Detailed Reports –** Reports must provide details overview with a line for each call showing call details including date, time, extension, called/calling number, destination/origin, duration, cost, trunk-line, and more.

2. **Summary Reports** – Reports must provide a summary overview with totals and averages of selected calls, duration and cost of the calls with an option to drill-down to view call details for individual users.

3. **Organizational Summary Reports** – Report must provide a summary overview of the telephone traffic of organization with an option to drill-down to view underlying departments and details of individual users.

4. **Exception Reports –** Reports exceptional calls: After Hours, Expensive, Long, Abandoned or Unassigned Calls.

5. **Graphical Reports -** Displays selected Historical, Usage and Traffic data in selectable graphical formats e.g. bar chart, pie chart spline and mark.

6. **Frequency Reports** - Shows the frequency of selected call items, e.g. most called, expensive, longest, etc.

7. **Custom Reports** – Customized reports to meet your specific reporting requirements. And reports can be exported to TXT, HTML, XML, Excel, PDF (password protected) format.

8. **Multi site capability:** System must capable to allow reporting on multi-site across network on TCP/IP from central location irrespective of make /type of telephone system.

9. **Real Time Graphical report:** System must capable display real time graphical report at point of time for system management & analysis.

10. **Traffic Analysis:** Traffic analyzer report must allow viewing the average & pick usage of calls for addition of trunk lines to avoid call drops & call disconnection.

11. **Bill generation**: Display bill of individual in proper format by mentioning name, deptt, section, and call details with total call charges for particular month or period.

1.15.5.8 Security feature:

1. Administrator is able to assign different level of access rights for different user.
2. System to be protected by authentication /password challenge to prevent unauthorized closing/disabling/shutdown.
3. User's activities (e.g. login or logout) are recorded onto log file.

1.15.5.9 **Hardware requirement**: The desktop PC /Workstation for Call billing system shall be supplied separately as per schedule, specifications mentioned elsewhere in the tender document.

1.15.6 TECHNICAL SPECIFICATION FOR INTEGRATED AUTO ATTENDANT CUM VOICE MAIL SYSTEM

The IP based EPABX system should be equipped with an integrated auto attendant cum voice mail system with customized features as per site requirement to meet the following requirement:

1. It should be OEM part of offered IP EPABX System including hardware and software modules
2. It should be either in skin hardware based or PC (software based)
3. It should provide GUI/ Window/Web based Application for system administration
4. It should be capable of handling min 8 simultaneous 8 incoming calls (ie minimum 8 port system)
5. It should provide IP/LAN Connectivity for call routing to/from EPABX.
6. It should provide playback of customized greetings with background music
7. It should provide Customized voice prompts to meet site specific requirement
8. It should provide Min two Language Options
9. It should provide Input of incoming digits against voice prompt
10. It should provide Automatic fax routing
11. It should provide Playback of music on hold, customized background music, promotional message during on hold/ transfer /progress
12. It should provide fully supervised call processing without any call drop, disconnections. In case of busy /no answer etc, same shall be announced to caller using predefined voice prompts and calls shall be redirected to voice mailbox or operator console as per site specific requirement.
13. It should provide routing of calls to operator, predefined extensions as per line status (busy, no answer etc)
14. It should provide Seamless routing of calls to Voice Mail System.

Voice Mail Features: Voice mail system enables a caller to leave recoded voice messages in a voice mailbox associated with an extension. The offered system should have an integrated database of voice mailbox linked with extension number or extension groups.

1. It should provide minimum 8 voice mail ports to access the voice mailbox.
2. It should support Min 100 hrs of record should be supported
3. It should support Min 1000 voice mailbox

Voice Mailbox:

Voice Mailbox numbers shall be same as extension numbers. Each voice mailbox shall have sufficient storage capacity for recoding / storage voice messages. Each voice mailbox shall have it user defined / customized greeting message and voice prompts to route incoming calls to another extension, operator or to voice mailbox.

Routing and recording of Voice messages:

A caller can leave a voice message to individual voice mailbox directly through interactive voice prompt of Voice Mail System or through automatic routing of incoming telephone calls to VMS during busy, no answer condition. Voice mail system should support standard digital audio formats line mp3, wav etc.

Retrieval of Voice Message: User can retrieve the messages directly from their individual telephone by dialing the voice mail system from any other extension by giving access codes and passwords for specific mailbox.

Email interface/PC interface: It should be possible to deliver the audio files from voicemail system to individual emails as audio attachments (in mp3, wav other digital format). Alternately it should be possible to Access/read/playback voice messages from individual PCS connected to the same IP network using web browser (http/https)

Voice mail Indication: Indication of unread voice mail shall be given by following ways

- Through assigned message wait lamp in analog phones
- Through LCD Display or designated function key (with LED lamp) of digital /IP phone
- Specific button of IP softphones/ Apps
- System generated interactive voice prompt during off hook condition of a telephone

1.15.7 TECHNICAL SPECIFIACTIONS OF VOICE, DATA, SIGNAL AND POWER CABLES

Specifications of Voice, data, control and signaling cables, connectors etc shall be FTP/STP type and approved by OEM of EPABX system as per International/ National standards, practice and guidelines meeting the following as minimum.

Subscribers Cables : From Analog, digital, ISDN subscriber interface module to Main Distribution Frame
Conductor type : Min 0.4mm tinned copper
Cable type : Shielded twisted color coded pairs overall PVC insulated
Termination at EPABX END : Factory Assembled, Tested and pre-terminated connector with latch/locking mechanism
Termination at MDF Side : Open for termination at site in MDF (Krone connector) .
Capacity /pairs : to match with number of ports available in subscriber modules
Digital trunk (PRI) interfaces cable: Screened EMC Shielded as per TIA/EIA/ITU/TEC standards

1.15.8 TECHNICAL SPECIFICATION OF INSTALLATION MATERIALS:

All installation materials required for installation testing and commissioning of complete IP based EPABX systems shall be included in the scope of supply including the following as minimum:

S/no	Details / Locations /Application	Material Description	Quantity
1	Routing of subscribers, trunks cables from EPABX Rack to Main Distribution Box	Min 12" Perforated Galvanized cable trey/ Or heavy duty aluminum Ladder type cable trey with all hardware angles brackets etc to accommodate all cable	As per Site requirement
2	Routing of AC cable Power supply cable from ACDB to FCBC input	Min 2"x2" Solid PVC Conduit/Cable Drain	As per Site requirement
3	Routing of DC cables from FCBC to Different Equipment	Through 2"x2" PVC conduits inside equipment rack	As per site requirement
4	Routing of OFC cable inside Equipment room uotpo Fiber management system	Through 2x2 Fiber-Duct/channels with cover and all angles and fittings	As per site requirement
5	Routing of CAT 6 Patch cables inside equipment rack	Through horizontal and vertical cable managers (to be supplied with Equipment rack)	As per site equipment
6	Routing of OFC patch cables	Through Flexible pipers outside the rack and through spiral wraps inside equipment rack	As per site requirement
7	Other hardware fittings Anchor bolts, angles, cable ties, markers, Hook and loop ties, wraps, cable tags, flag ties, lugs, terminals, nuts and bolts etc	For completing mechanical and electrical installation works	As per site requirement
8	Earthin Strip and Earthing conductors	Telecommunications Main Grounding Busbars with Equipment Bonding Conductor min 6/10 AWG green wire with yellow horizontal stripe pre-terminated	One set for each site
9	Other hardware fitting		As per site requirement

PART-V

SECTION II

TECHNICAL SPECIFICATIONS

OF

DESKTOP DIGITAL AND IP TELEPHONES

Item No	Description	Qtty	Unit
2	Desktop Digital Telephone	34	Nos
3	Desktop IP Phone	09	Nos

2.1 TECHNICAL SPECIFICATION FOR DESKTOP DIGITAL PHONE:

a) Desktop digital telephone with tilted/ elevated support /stand.

b) Should work using one pair of standard telephone cable extended from the EPABX.

c) Fully line powered system, (no need for any external power to operate)

d) Digital line interface.

e) Tilt-able LCD Graphical Display of high resolution with minimum 4-line text message on screen

f) Messages wait Indicator.

g) Incoming call indication through Display and Optical (Visual) Alert

h) Incoming call indication (thru display/Optical alert) while one line is in use.

i) Minimum 16 programmable keys & provision for additional soft-keys by addition of extra key modules.

j) 4 way keys for menu navigation.

k) Incoming Speech Gain Control.

l) Ringer Volume Control.

m) Full Speakerphone with high audio quality in Hands-free operation (full Duplex) & Mute facility.

n) On-Hook dialing from key pad (no need to press speaker, line, or other function keys, before dialing a telephone number).

o) Hot dialing from key pad for transfer, conference (no need to press hold, flash or other function keys, while a conversation is already in progress)

p) Adjustable Handset and Monitor speaker volume.

q) Optical call alert (LED/LCD) for incoming call

r) Echo cancelling for local echo (AEC full duplex)

s) Alphanumeric keypad for dial-by-name

t) Make: OEM of EPABX system

Offered Desktop Digital Telephone shall be included in POC testing for verifying Build quality, aesthetics, ruggedness, ease of operation and technical features, functions etc

2.2 TECHCHNICAL SPECIFICATION FOR DESKTOP IP PHONE

The connection for IP phone will be provided by existing CAT-5 cable that is being used for data access. The IP hard phone should have inbuilt dual ports Ethernet Switch of 10/100/1000 Mbps to connect desktop PC through RJ-45. Other features should be as follows:

a) 10/100/1000 Mbps connection: half/full duplex with auto negotiation and manual configuration. The maximum cable length is up to 60m

b) IP phone should have inbuilt Ethernet switch with QoS support with the facilities for TOS diffserv & 802.1p/q.

c) Ethernet (10/100/1000Mbps) line interface with secondary (10/100/1000 Mbps) port for collocated PC or Laptop with IEEE 802.3af power over Ethernet compliant ports.

d) IP hard phone should support protocol H.323/SIP for IP Telephony.

e) Protocol support for voice quality G.711, G.722, G.729a/b and for echo cancellation.

f) IP addressing Static or dynamic IP parameter configuration. A DHCP client should be integrated in the set

g) IP Programming and configuration through internal man machine interface during its activation allowing configuration of the main IP parameters such as:- MAC address access, Program a static IP address (if no DHCP server) and IP Subnet mask, Router IP address, Frame tagging activation/deactivation & default VLAN 802.1pq etc.

h) Web based programming and administration using PC interface (http/https over LAN/WAN)

i) Tilt-able Graphical Display of high resolution, minimum 4-line text message on screen

j) Messages wait Indicator.

k) Incoming call indication (display) while one line is in use.

l) Minimum 16 programmable keys

m) 4 way keys for menu navigation.

n) Incoming Speech Gain Control.

o) Ringer Volume Control.

p) Full Speakerphone with high audio quality in Hands-free operation (full Duplex) & Mute facility.

q) Hot dialling from key pad for call transfer, conference (while a conversation is already in progress).

r) Adjustable Handset and Monitor speaker volume.

s) On-Hook dialling

t) Optical call alert (LED/LCD) for incoming call

u) Echo cancelling for local echo (AEC full duplex)

v) Alphanumeric keypad for dial-by-name

w) Make: OEM of IP EPABX system or as per approved make (Appendix-A)

Offered Desktop IP Telephone shall be included in POC testing for verifying Build quality, aesthetics, ruggedness, ease of operation and technical features, functions etc

PART V

SECTION- III

TECHNICAL SPECIFICATIONS OF

COMPLETE OFC BASED LAN/WAN SYSTEM

Item No	Description	Qtty	Unit
4	Complete OFC Based LAN/WAN System	1	Lot

DETAILED BOQ FOR OFC Based LAN/WAN System			
S/no	**Description**	**Quantity**	**Unit**
1	**Managed 24 port L2/L3 Ethernet Switch chassis** equipped with 6 x SFP based fiber port (Single Mode, Gigabit LAN) 6 x SFP transceiver 12 x 10/100/1000 baseT LAN port (1+1) redundant power supply for -48VDC operation	**2**	**EA**
2	**Managed Ethernet Access Unit** equipped with Min 2 x SFP based fiber port (SM, Gigabit) with SFP transceivers Min 8 x 10/100/1000 baseT LAN Port -48VDC power supply unit	**6**	**EA**
3	12-fiber jelly filled armoured multi-tube single mode optical fibre cable conforming to latest issue and tables of ITU-T G.652	**90000**	**Meter**
4	19" rack mountable 24 Port fiber management System equipped with splicing trey and fiber patching + distribution frame (SC Ultra PC Type)	**8**	**EA**
5	Single mode, simplex fiber optic patch cords 10 M with Ultra PC finish	**40**	**EA**
6	Color coded, Factory Assembled, CAT6 UTP/STP Patch cords Length and quantity as per site requirement for complete wiring of Server, Media Gateways, Switch, Workstations, Control units other	**1**	**Lot**

	devices that requires LAN connectivity and 10 spare cables for future use.		
7	Installation materials as per site requirement	**1**	**Lot**
8	CD/Documentation, manual etc	**1**	**Lot**

4.1 TECHNICAL SPECIFICATION OF L2/L3 GIGABIT MANAGED SWITCH

Make : Vendor to Specify
Model : Vendor to specify
Description : Managed L2/L3 Gigabit Ethernet Switch
Application : To provide Gigabit Ethernet connectivity over single mode OFC
Power Supply : Redundant hot-swappable power supplies (of same type)
-36 to -72VDC (-48VDC nominal)
Physical : 19" Rack mountable (Vendor to specify dimensions)
Number of ports: : Min 22 ports with SFP transceivers supporting 10/100/1000 Mbps speeds over copper and Fiber
Connectors SFP slot for each port

Equipped Network port : Min 6 (six) with SFP (OEM part) transceivers of following specifications

Type	Hot swappable
Interface	Gigabit Ethernet
Standard	1000BaseLX10, IEEE 802.3 (GbE)
Fiber connector	2 x LC Connector
Wavelength	1310nm or 1550nm,
Fiber type	9/125 single mode fiber
Min Rx power	-20 dBm
Min Tx power	-9 dBm
Typical range	~ 10 Km over G.652 SM fiber

Equipped user ports : Min 12 ports supporting 10/100/1000BaseT, IEEE 802.3 over UTP (RJ-45)

Max. Frame Size	**:** 9,216 bytes
Forwarding Bandwidth	**:** 64 Gbps
Forwarding Rate	**:** 95 Mpps
MAC Address Table	Up to 32,000
VLANS	Up to 4K

Certifications/Standards compliance

MEF , EPL and EVPL (Vendor to give details)

Compliance

MEF 6 (E-Line – EPL and EVPL), MEF 10
IEEE 802.1d Spanning Tree Protocol (STP)
IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
IEEE 802.1s Multiple Spanning TreeProtocol (MSTP)
IEEE 802.3ad Link Aggregation Groups (LAG)
IEEE 802.3ad Link Aggregation ControlProtocol (LACP)
IEEE 802.1ag OAM-CFM
IEEE 802.3-2005 (formerly 802.3ah) OAM-EFM
IEEE 802.1p QoS
IEEE 802.1q VLANs
IEEE 802.3 Ethernet LANs
IEEE 802.3u Fast Ethernet

Management
Out-of-band: via Dedicated terminal port (EIA-232) and Ethernet management port
Inband: via Ethernet network or user ports
Security
Access List (ACL)
ICMP rate-limiting
Port and VLAN security
RADIUS
SNMPv3
SSHv2
TACACS+
Indicators: Multicolour LED indication for system, power, port/link status/ activity

4.2 TECHNICAL SPECIFICATION OF MANAGED ETHERNET ACCESS UNIT

Make	: Vendor to Specify
Model	: Vendor to specify
Description	: Managed Ethernet Access Unit –for remote Units
Application	: To provide Gigabit Ethernet connectivity over single mode OFC
Power Supply	: -36 to -72VDC (-48VDC nominal)
Physical	: Vendor to specify dimensions
Mounting	: To be supplied with hardwares for mounting in standard 19" rack

Network ports Min Two network ports (SFP port) supporting redundancy Link aggregation (1+1) based on IEEE 802.3ad and Dual homing (1:1) for connecting two different upstream devices.

Each device should be equipped with 2x SFP transceivers (OEM part) as per the following specifications:

Interface	Gigabit Ethernet
Standard	1000BaseLX10, IEEE 802.3 (GbE)
Fiber connector	2 x LC Connector
Wavelength	1310nm or 1550 nm
Fiber type	9/125 single mode fiber
Min Rx power	-20 dBm
Min Tx power	-9 dBm
Typical range	~ 10 Km

Equipped user ports : Min 8 (Eight) 10/100/1000 BaseT, IEEE 802.3 over UTP (RJ-45) or as per site Requirement (including two spare ports) whichever is higher. If required number of port could not be provided from a single device additional device of same make and models has to be provided without any additional cost implications.

Max. Frame Size **:** 1632 bytes
MAC Address Table Up to 8,192

Certification MEF, EPL, (Vendor to give details)
Compliance IEEE 802.3, 802.3u, 802.1D, 802.1Q, 802.1p, 802.1ag, 802.3ad, 802.3ah

Management

Out-of-band: via Dedicated terminal port (EIA-232) and Ethernet management port
Inband: via Ethernet network or user ports over http, telnet session supporting following protocols

RADIUS (Client Authentication)
SSH Web-based management
SSL Secure Shell Telnet session
SNMP for SNMP sessions

Indication: Multicolour LED indication for system, power, port/link status/ activity etc

Supply: complete system with power supply, programming cable/connectors, user manual, mounting kit etc.

Note:

1) Offered Managed L2/L3 gigabit Ethernet Switch and Access Units shall be of same make
2) Offered Managed Ethernet Access Units shall of same type (Model, Version, configuration etc)

4.3 TECHNICAL SPECIFICATION OF OFC CABLE

Brief description: 12-fiber single mode jelly filled armoured multi-tube optical fibre cable conforming to latest issue and tables of ITU-T G.652

1.1.1 The jelly filled 12F armoured optical fiber cables (multi-tube) as per specification mentioned in the tender.
1.1.2 Single mode optical fiber cable shall fully comply with requirement of the following specification and meet the latest issue and tables of ITU-T G.652.
1.1.6 The length of optical fiber cable in each standard drum shall be 4KM ± 0% to 5 % and shall not have any joint.
1.1.7 All the fibers shall be colour coded with UV curable inks and colour coding shall be as per latest specification or specified elsewhere in this document.
1.1.8 The life of cable shall be at least 15 years.
1.1.9 The cable shall be protected against damages from termite, rodent, fire chemicals (such as oil & natural gas, LPG and other petroleum products), moisture, and water over the lifetime of the cable.
1.1.10 The characteristics of Fibers and Optical Fiber cable shall not change during entire life of the cable/fiber.
1.1.11 Colour coding of loose tubes For 12 F armoured cable (as per ITU-T G.652)
1.1.12 No of filler tubes: min 2 tubes as a Fillers for maintaining the circularity of OFC
1.2. **Optical Requirements: as per latest recommendations and tables of ITU T G.652**

1.3.9.1	**Tensile strength**	: Vendor to specify
1.3.9.2	**Crush load**	: Vendor to specify
1.3.9.3	**Impact load**	: Vendor to specify
1.3.9.4	**Torsion load**	: Vendor to specify
1.3.9.5	**Water penetration**	: Shall meet or exceed the limit as per latest TEC specification.
1.3.9.6	**Cable bend**	: Minimum – bending radius will be 20 D, where 'D' is outer diameter of the cable.

1.3.9.7 Wherever there is ambiguity in the specifications/stands/ other details, TEC's latest specification shall be followed.

1.4 Other Requirements:

1.4.1.1. **Cable Core Assembly**: Primary coated fibers are placed in loose tubes, which are around a central strength member. It shall be protected by means of filling compound having properties of non-hygroscope dielectric material and / or swelling tape.

1.4.1.2. **Secondary Protection**: Loose packing within a tube, which shall be filled with thixotropic jelly, to protect primary coated fibers.

1.4.1.3. **Strength Member**: Fiber Reinforced Plastic with 2 ± 0.05 mm of diameter which will provide strength and flexible enough, in order to keep the fiber strain within permissible values.

1.4.1.4. **Filling Compound**: it shall be compatible to fiber, secondary protection, core wrapping etc. (preferably thixotropic jelly). It shall be removable easily for splicing.

1.4.1.5. **Filler Tube**: As mentioned in the diagram to maintain the circularity of the cable.

1.4.1.6. **Aramid Yarn**: To be used around the loose tubes as per specification for extra protection to the loose tubes.

1.4.1.7. **Moisture Barrier**: Water swellable yarn (dry binder threads impregnated with super-absorbent-polymer (SAP)) shall be applied helically around the glass / aramid yarn with a minimum pitch of 25 mm.

1.4.1.8. **Inner Sheath**: MDPE of size 1.2 mm to 1.5 mm.

1.4.1.9. **Armoring**: Armoring shall be provided over inner sheath by corrugated low carbon steel armour tape or corrugated electrolytic chrome coated steel (ECCS) armour tape to make the cable rodent and termite proof. The steel armour shall be coated on both sides with ethylene acrylic copolymer to inhibit corrosion and to bond to the outer jacket. The thickness of ECCS alloy shall not be less than (0.155 ± 0.005) mm. The thickness of ethylene acrylic copolymer of the tape should be (0.055 ± 0.005) mm. The height of corrugation shall be 0.6 mm and the pitch of the corrugated tape shall be maximum 2.5 mm. The chemical and mechanical properties shall be as per TEC and International standards. The armoring tape shall apply longitudinally with minimum overlap of 6 mm.

1.4.1.10. **Outer Jacket**: The armored shall be covered with tough weather resistant High Density Polyethylene compound (HDPE) of thickness of minimum 1.5 mm. It shall be circular, free from holes, joints, mended pieces and other defects.

1.4.1.11. **Rip Cord:** 2 numbers below the MDPE sheath and 2 numbers below the HDPE outer sheath.

1.4.1.12. **Electrical continuity** of the steel tape layer shall be maintained between the ends of the cable in each drum.

1.4.1.13. Over all cable, outer diameter shall no exceed 16 ± 0.5 mm.

1.4.3. **Cable Identification** : All the cable shall have following information on the outer sheath / jacket:

- Fiber count and Type (like 12F, G.652, SM, size of cable).
- Month & year of manufacture.
- User Name.
- Length marking at 1m intervals.
- Marking: The Cable must be marked as "GAIL (India) Limited" at an interval of 1 Meter with hot foil indentation.
-

1.5 **Environmental Requirement:**

1.5.1 The Optical Fiber Cable shall be capable of working in the temperature range of -20°C to 70°C.

1.5.2 It shall be capable of withstanding different climatic and soil (including saline) conditions in India.

1.6 Packaging and Marking Requirements:

Following details shall be distinctly marked on weatherproof material on outer sides of drum flange:

- User's name & address.
- The Cable must be marked with "GAIL (India) Limited" at an interval of minimum 1 meter hot foil indentation.
- Drum No. & Cable Identification Number.
- Size and length of cable.
- Gross weight in Kgs.
- Arrow showing the direction the drum can be rolled
- Mark indicating the location of inner end of cable.
- Cable end in the drum to be protected with heat shrinkable sleeves.
- Month, Year and batch number of manufacturing.
- Type of cable.
- Laminated sheet for fiber Attenuation results at 1310 nm, 1550 nm shall be attached with each drum.

All material is to be packaged so as to provide adequate protection against deterioration and physical damage in order to ensure safe arrival at installation site.

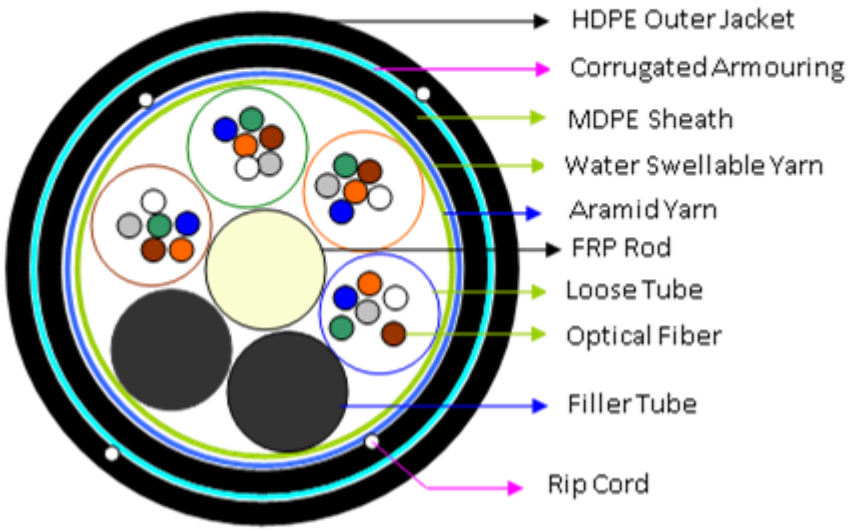
1.7 **Handling and Storage Requirements:**

The Supplier shall specify the cable handling precautions during:

- Storage
- Transportation
- Laying of cable
- Cable preparation & splicing

The above Handling and storage specifications must comply with the relevant National / international standard.

1.8 Cross Sectional Diagram of cable is enclosed fore reference



Cross Sectional Diagram of 12 Fibers Optical Cable

Note:

- Diagram is not to scale.

4.4 TECHNICAL SPECIFICATION OF FIBER MANAGEMENT SYSTEM

Description: 19" Rack mount fiber management System
Application: Optical fiber cable termination for Telecom Systems (Generic splicing, patching and termination)
Make : Vendor to specify
Model : Vendor to specify
Description: Fiber management system is a shelf assembly for fiber termination and management inside networking rack enclosure of 19"/21" size. It is complete assembly including integrated splicing trey and patch panels in the same enclosure.
Construction : MS (CRCA) with powder coated Epoxy paint
Height : Min 1U
Patch panel : SC Ultra PC type (Female) on both side (OFC cable and patch cord side)
Fiber type : Single mode
Capacity : Min 24 fiber splicing, patching and termination
Cable Entry : Min 02 (Rear and Side) with end cover
Mounting : Sliding / Telescopic type to provide easy access to rear connections
Scope of supply: Each FMS should be supplied with:
1) 24Fiber FMS enclosure with mounting HW for 19" rack installation
2) Integrated or generic splicing cum patching trey of 24F capacity with all accessories
3) Integrated patch panel of 24 F capacity with SC Ultra PC (F) type termination with protective cover against dust ingress.
4) Space and accessory for horizontal and vertical management of patch cables
5) Single mode (G.652) factory tested, pre-assembled and numbered pigtails with protective cover / Jacketed 24 Unit
6) Loose tubes for protecting bare fibers of cable end
5) Splicing accessories, labeling accessories, Instruction manual, Test report etc

4.5 TECHNICAL SPECIFICATION OF FIBER OPTIC PATCH CORD -10 METERS

S/N	PARAMETER	SPECIFICATION
1	MAKE	VENDOR TO SPECIFY
2	MODEL	VENDOR TO SPECIFY
3	TYPE	SINGLE MODE, SIMPLEX
4	APPLICATION	OPTICAL LONG HAUL TELECOM NETWORK
5	FIBER TYPE	SINGLE MODE, min 2.0 MM JAKETED
6	LENGTH	Min 10 METER
7	CONNECTER 1	SC ULTRA PC (FMS end)
8	CONNECTOR 2	LC (SFP End)
9	INSERTION LOSS	< 0.15 dB (Typical) MAX=0.5 dB
10	REFLECTANCE	>= - 58 dB (Typical) MAX =-55 dB
11	CONSTRUCTION	PUSH PULL LATCHING MECHANISM WITH AUDIABLE CLICK ENSURING PROPER CONNECTION
12	FERRULE TYPE	CERAMIC
13	HOUSING	COMPOSITE
14	CONNECTOR COLOR	BLUE
15	CABLE COLOR	YELLOW
16	OUTER DIA	Min 2.0 MM
17	STANDARD	TIA/EIA -604.2 COMPLIANT
18	TEST REPORT	TO BE SUBMITTED WITH SUPPLY

4.6 **TECHNICAL SPECIFICATION OF CAT6 LAN CABLE**
Make: Vendor to Specify
Cable Type: Cat6 Patch cable having following features:

1. Used for patching between two RJ45 outlets in a Category 6 network.
2. Each RJ plug should have latch protector to reduce the possibility of snags within the cord bundle.
3. RJ45 plugs both ends.
4. Anti-snag feature on RJ plug clip.
5. Mounded boot to ensure minimum bend radius.
6. Category 6 performance.
7. Factory assembled and tested as per latest standards

Length: Min 3Ft for patching
Min 7 Ft for subscriber connections
Min 15ft between two systems

Color: Different type of Color schemes should be provided depending upon applications/type/speed etc (Red/ Blue/ Green/ Grey/ Black other)

Reference Scheme 1

Red : Server Connections
Blue : Network Connections/ system interconnections
Grey : Subscriber Connections

Reference Scheme 2

Red : Primary connections
Blue : Secondary connections
Grey : Subscriber Connections

Note: Quantity, length and Color shall be as per sit specific configuration to meet complete cabling, interconnection, interface requirement plus 10 spare patch cable for future use.

PART-V

SECTION- IV

TECHNICAL SPECIFICATIONS

FOR
COMPLETE FCBC SYSTEM

Item No	Description	Qtty	Unit
5	Complete FCBC System	1	Lot

DETAILED BILL OF MATERIAL

<table>
<tr><th>S/no</th><th>DESCRIPTION</th><th>Quantity</th></tr>
<tr><td>1</td><td>-48VDC SMPS BASED MODULAR POWER PLANT (FCBC) FOR TELECOM SYSTEM as per the following configuration
<table>
<tr><th>S/no</th><th>Telephone Exchange Locations</th><th>Input Supply</th><th>Min DC Load (Excluding Battery current)</th><th>Battery Capacity</th><th>Min SMPS Redundancy</th><th>Quantity</th></tr>
<tr><td>1.1</td><td>QC Lab-Main</td><td>230 VAC</td><td>50 A</td><td>200 AH</td><td>N+1</td><td>01</td></tr>
<tr><td>1.2</td><td>SS4</td><td>230 VAC</td><td>50 A</td><td>200 AH</td><td>N+1</td><td>01</td></tr>
<tr><td>1.3</td><td>SS1</td><td>230 VAC</td><td>25 A</td><td>65 AH</td><td>N+1</td><td>01</td></tr>
<tr><td>1.4</td><td>SB1</td><td>230 VAC</td><td>25 A</td><td>65 AH</td><td>N+1</td><td>01</td></tr>
<tr><td>1.5</td><td>D/S</td><td>230 VAC</td><td>25 A</td><td>65 AH</td><td>N+1</td><td>01</td></tr>
<tr><td>1.6</td><td>GAIL GAON</td><td>230 VAC</td><td>50 A</td><td>200 AH</td><td>N+1</td><td>01</td></tr>
</table></td><td>01 Lot</td></tr>
<tr><td>2</td><td>Installation material for Complete System
230 VAC main input cable (3core, Armoured cable, Min 20 meter per site)
MCB for AC Isolation (min 1 set per site)
DC Output Distribution Frame with min 6 nos of MCB (Min 1 set per site)
Battery Cable and connectors as per site requirement (Min 2x 5 Meter per site)
Equipment earthing cable , terminals, hardware kit etc (one complete lot per site)</td><td>01 Lot</td></tr>
<tr><td>3</td><td>Mandatory spares
Rectifier module : 02 nos
Alarm and control module : 02 nos
Spare Fuse, MCB, Terminal, lugs etc : 01 lot consists of one of each type</td><td>01 Lot</td></tr>
</table>

4.0 DESCRIPTION OF FCBC SYSTEM:

-48VDC SMPS BASED MODULAR POWER PLANT (FCBC) FOR TELECOM SYSTEM.

4.1 Application: The FCBC power Plant shall be used to provide uninterrupted DC input power to Telecom systems like EPABX, Multiplexers, OFC / Microwave transmission equipment s on 24x7 basis. System shall be designed for unmanned operation with network access for monitoring and controlling

4.2 Detailed Technical Specification: Each FCBC system shall consist following subsystems as minimum:

a) 19'' rack mountable system chassis having at least 25 % spare capacity
b) AC Over & under Voltage Protection with auto cut-off and restoration.
c) One No. Microprocessor controlled Alarm / Control module
d) One no. Low Voltage Disconnect.
e) DC distribution: min 3 MCB's upto 63A each
f) 6 Nos. PFC Contacts for Remote Monitoring of Alarms
g) Surge Protector Class 'C'.
h) Rectifier modules equipped with N+1/1+1 redundancy as per requirement
i) Serial (USB/RS-232) or Network (LAN) interface for local /remote management via Windows based PC
(k) Software for system management and control vial PC
(l) AC input (three ph./ Single phase) MCB

4.3 Technical Specifications of Alarm / Control Unit : The supplied alarm /control unit should provide local and remote monitoring and Control via front panel buttons, LCD-display, USB- or RS-232 Interface, as well as via modem, Ethernet, web and SNMP.

4.3.1 **Required Features:**

i. Front panel LCD and buttons for on-site service without PC.
ii. USB/RS-232/LAN interface for local/remote monitoring and control via PC.
iii. 6 user programmable relay outputs for remote monitoring
iv. Monitoring and testing without site attendance
v. Temperature compensated charging
vi. Alarm/event log with time and date
vii. Windows-based PC communication software

4.3.2 Communication to Rectifiers: by using digital interface architecture like CAN-bus communication to support dedicated communication channel with each rectifier. It should provide following monitoring and control functions**:**

4.3.3 System Management

Output Voltage Measurement
Total Load Current Measurement
Load/Battery Disconnect
Alarm Level Settings (major / minor)
Alarm Log (min 500 events)
Real Time Clock with Battery Backup
Site Text/ID
Test of Relay Outputs
Voltage Level setup

4.3.4 **Battery Management**

Battery Current Measurement
Battery Testing
Battery quality indication
Battery Boost Charging
Temperature Compensated Charging

4.3.5 Rectifier Management

Available information about each rectifier,
Individual Rectifier Current Measurement
Individual Rectifier Input Voltage

4.3.6 Monitoring and control: Through LCD and keypads for local operations**.** In normal operation, the front LCD will display the output voltage, battery current, load current and charge mode. If any alarm (major or minor) is activated, it should be indicted by audible alert (buzzer/beeper) and by visual indication via multicolour LED (front panel), the detail text of alarm should be presented in the LCD, and the corresponding alarm relay is activated for remote monitoring.

4.3.7 Alarms: Following alarms can be set up with monitoring of minor, major, average and peak levels:

4.3.7.1 System Alarms:

Mains Failure (individual phases)
Load Disconnect (voltage or timer)
Load Fuse
Load Current

4.3.7.2 Battery Alarm

High Battery voltage
Low Battery voltage
Battery Disconnect
Battery Fuse
Battery quality indication
Battery discharge current

4.3.7.3 Rectifier Alarm

Rectifier Failure
Rectifier Current Limit
Rectifier Overvoltage Protection
Rectifier Current

4.4 Technical Specification Rectifier modules:

All rectifiers' modules must be of same type (i.e. make, model, rating,etc)
All power plants must be designed with same type of rectifiers having min DC current capacity of 25A @48VDC.
All rectifier modules must meet or exceed following technical specification

AC Input

Voltage range	176 – 275 VAC
Frequency	45 to 66Hz
Maximum Current	Vendor to specify
Power Factor	> 0.99 at 50% load or more
Input Protection	Varistors for transient protection Mains fuse in both lines Disconnect above 300 VAC

DC Output

Voltage	53.5 VDC (adj. range: 43.5-58.0 VDC)
Output Power	Vendor to specify
Maximum Current	Vendor to specify
Input Current Sharing	Vendor to specify
Static voltage regulation	Vendor to specify
Dynamic voltage regulation	Vendor to specify
Output voltage	> 43.5 VDC at full load
Ripple and Noise	< 100 mV peak to peak,
Output Protection	Overvoltage shutdown Fuse/ Short circuit proof
Alarms/ Indications:	Low mains shutdown Rectifier Failure Overvoltage shutdown on output Low voltage alarm at 43.5V Input voltage out of range
Efficiency	min. 92% at 25-100% load
Isolation	Input and output 3.0 KVAC

Input earth	1.5 KVAC
Output earth	0.5 KVDC

Standard and Compliance:

Electrical safety	Required	Vendor to specify
EMC	Required	Vendor to specify
Environment	Required	Vendor to specify
RoHS compliance	Required	Vendor to specify

Installation material should consist of all hardware, cable and connectors, terminal, lugs, fuse etc required for commissioning the system at site

Part-V

Section- V

TECHNICAL SPECIFICATIONS

OF

UPS FOR TELECOM SYSTEMS

Item No	Description	Qtty	Unit
6	UPS for Telecom Systems	3	Nos

6.0 TECHNICAL SPECIFICATIONS FOR UPS FOR TELECOM SYSTEMS

Description: Offered online UPS system shall provide 230VAC uninterrupted power supply to desktop Work station PCs proposed for running following applications, services on round the clock basis.

1) Call monitoring and billing Application
2) Integrated auto attendance cum Voice Mail System
3) EPABX NMS, Maintenance console and other services.

In addition to the above, if communication servers of offered IP EPABX system requires 230VAC UPS power, same should be provided using these UPS system. If required UPS of higher capacity needs to be provided without any additional cost implication to GAIL to meet site specific power requirement for commissioning of complete system.

Minimum specification of offered Online UPS system shall be as follows:

TECHNICAL SPECIFICATIONS UPS

Input	: 230 VAC, 50 Hz, Single phase
Output	: 230 VAC, 50 Hz, Single phase
UPS Type	: Online UPS
Output power Capacity	: 1000 VA or Higher to meet site specific requirement
Efficiency at Full Load	: 95%
Output Waveform Type	: Sine wave
Output distortion	: < 5% at full load
Battery backups	: to support at least 4 hours backup with external batteries
Battery type	: External VRLA, SMF 12V, upto 65AH (to be provided by GAIL)
Battery bank Voltage	: ~36 VDC or ~-48VDC (nominal)
Output Connections	: Vendor to specify
Orientation	: Interchangeable Tower or 19" Rack mount
Output connector	: Min 4 IEC type connector per UPS
Indications	: Illuminated digital LCD display Mains, Battery, load, backup time etc
Audio Alerts	: On UPS main, failure/ load on battery, bypass etc
Communication	: Via SNMP, USB, & RS-232 communications

Standard and Compliance:

Electrical safety	Required	Vendor to specify
EMC	Required	Vendor to specify
Environment	Required	Vendor to specify
RoHS compliance	Required	Vendor to specify

.

Part –V

Section- VI

TECHNICAL SPECIFICATIONS

FOR

PC, WORKSTATIONS & MANAGEMENT CONSOLE

Item No	Description	Qtty	Unit
7	PC, Workstation, Management Console	2	Nos

7.0 TECHNICAL SPECIFICATIONS OF DESKTOP WORKSTATION, CONSOLE PC FOR IP BASED EPABX SYSTEM:

Application: Offered desktop Workstation PC Console should be designed for heavy duty applications to run round the clock basis without need for any preventive maintenance, shutdown etc for the following type of applications and services:

1) Installation and running of Call monitoring and billing Application
2) Installation and running of Integrated auto attendance cum Voice Mail Application
3) Installation and running of EPABX NMS, Maintenance console and other services.

S/no	Parameter	Specification
1	Make	Vendor to specify
2	Model	Vendor to Specify
3	Application	For running EPABX Applications and Functionalities on round the clock basis (24 x 7 x 365 days)
4	Type	Workstation PC or Low end Server Designed to operate on 24x7 basis
5	Orientation	Horizontal / vertical
6	PROCESSOR	Min Intel(R) Xeon(R) 3.06GHz/8MB L3 Cache/4.8GT/s
7	Operating System	HW should support Windows(R) 7 Professional 64bit However, actual OS supplied should be compatible to Proposed EPABX application.
8	SECURITY	Licensed Genuine Antivirus, spam/ malware filter, Internet security software to be provided preloaded by the vendor with min 2 years Subscription.
9	CHASSIS	Minitower /other
10	DISPLAY	To be supplied with Min 19" Widescreen Flat Panel Monitor of same OEM
11	MEMORY	Min 4GB (2x2GB) DDR3 SDRAM, 1333MHz, ECC
13	HARD DRIVE	Min 300GB SATA (10,000RPM) Hard Disk Drive,
14	OPTICAL DRIVE	16X max SATA DVD+/-RW with Dual Layer Write Capabilities
16	VIDEO CARD	Min NVIDIA Quadro 600 or Equivalent (1GB)
17	NETWORK CARDS	Min 1x 10/100/1000 Ethernet
19	KEYBOARD	Enhanced Multimedia USB Keyboard
20	MOUSE	USB Optical Mouse
22	SPEAKER	Internal Speaker
23	Software	Genuine OS CD with License Genuine Antivirus / Security CD with license System recovery CD/DVD Resource /Utility DVD Burning SW
24	Accessories	All standard accessories required for system operation should be supplied by the Vendor

APPENDIX A

LIST OF APPROVED MAKES

S/no	Equipment, System, subsystem Details	APPROVED MAKES
1	Communication Server -HW	OEM OF IP EPABX SYSTEM OR DELL/IBM/HP/FUJITSU having proven HW/SW compatibility with offered IP EPABX system
2	Communication Server SW, other Applications Software's of IP EPABX system	OEM OF IP EPABX SYSTEM
3	Equipment RACK	OEM OF IP EPABX SYSTEM OR APW/PRESIDENT/ RITTAL/SCHNEIDER/APC
4	Desktop Digital Phone	OEM OF IP EPABX SYSTEM
5	Desktop IP Phone	OEM OF IP EPABX SYSTEM or Cisco, Polycom (for SIP Phone)
6	IP Soft Phone, PC Based Operator Console SW	OEM OF IP EPABX SYSTEM
7	Integrated Auto attendant cum Voice mail system	OEM OF IP EPABX SYSTEM or other compatible systems
8	Call Billing System	OEM OF IP EPABX SYSTEM or other compatible systems
9	FCBC	Eltek/Delta/Eaton/ Emersion/ Amara Raja/ GE/APC other reputed make meeting all technical requirements
10	PC, Workstation, System Console	Dell/HP/IBM
11	OFC Cable	Sterlite, RPG, HFCL, TCL, HCL, Birla Ericsson, Finolex, or any other BSNL /TEC approved manufacturer
12	UPS	APC, Libert, Emersion
13	Managed Gigabit Ethernet Switches, Access Unit.	OEM of IP EPABX OR Rad, Tejas, ECI, Cisco, NSN, Enterasys, Alcatel Lucent, Avaya, Moxa, Juniper, TeLCO, Overture, Erricsson, Ciena, Transition, Accedian, Broadcom
14	CAT6 Patch Panel	KRONE/AVAYA/SYSTIMAX/TYCO/ADC/PANDUIT/MOLEX/LEVITON/CORNING/AMP/MOLEX
15	Fiber Management System	RAYCHEM/3M/KRONE/AVAYA/SYSTIMAX/TYCO/ADC/ PANDUIT/MOLEX/LEVITON/CORNING/AMP/MOLEX
16	Optical Patch Cord, couplers, connectors	KRONE/AVAYA/SYSTIMAX/TYCO/ADC/PANDUIT/MOLEX/LEVITON/CORNING/AMP/MOLEX
17	MDF and Tag Block	Genuine Krone Only from ADC/ TYCO
18	Analog, digital, PCM, PRI, other Signal Cables, Connectors	OEM of IP EPABX, or Krone, AMP, Tyco, other makes as per ITU, IEEE, TIA, EIA recommendations

PART VII

DETAILS OF BUYBACK ITEMS

PART VII-DETAILS OF BUYBACK ITEMS

After commissioning and handing over of new system to GAIL, vendor has to buyback the following items as it as where basis which includes the following

Complete decommissioning of the equipment's
Handling loading and transportation of materials from GAIL's premises for further disposal and recycling

Details of Buyback Lot:

Complete EPABX Systems installed /equipped hardware and software's	-01 Lot
Loose/faulty/spare parts of EPABX systems	-01 Lot
Digital telephone instruments and power supply/line drivers	-01 Lot
HDSL/S.HDSL Modems used for EPABX interconnections	-01 Lot
Complete voice mail system hardware and software's	-01 Lot
Complete Call billing system hardware and software's	-01 Lot
Complete -48VDC FCBC systems excluding batteries	-01 Lot

Further details of Buyback items are enclosed as per Annexure – E